CDC73 gene

cell division cycle 73

Normal Function

The *CDC73* gene (also known as the *HRPT2* gene) provides instructions for making a protein called parafibromin. This protein is primarily found in the nucleus of cells and is likely involved in regulating gene transcription, which is the first step in protein production. Parafibromin is also thought to play a role in cell growth and division (proliferation), either promoting or inhibiting cell proliferation depending on signals within the cell. When parafibromin is found outside the nucleus, it appears to be involved in the organization of the cell's structural framework (the cytoskeleton).

Health Conditions Related to Genetic Changes

familial isolated hyperparathyroidism

Inherited mutations in the *CDC73* gene have been found in some families with familial isolated hyperparathyroidism, a condition characterized by overactivity of the parathyroid glands (primary hyperparathyroidism). These glands release a hormone that helps control the normal balance of calcium in the blood. Primary hyperparathyroidism disrupts this balance, which can lead to high blood calcium levels (hypercalcemia), kidney stones, thinning of the bones (osteoporosis), nausea, vomiting, high blood pressure (hypertension), weakness, and fatigue in people with familial isolated hyperparathyroidism. Primary hyperparathyroidism is a characteristic feature of hyperparathyroidism-jaw tumor syndrome (described below); however, familial isolated hyperparathyroidism is diagnosed in people with hyperparathyroidism but not the other features of hyperparathyroidism-jaw tumor syndrome.

CDC73 gene mutations that cause familial isolated hyperparathyroidism likely result in decreased activity of the parafibromin protein. Reduced parafibromin activity can cause increased cell proliferation, leading to the the formation of tumors involving the parathyroid glands. Parathyroid tumors in people with familial isolated hyperparathyroidism are usually noncancerous. The resulting overactivity of the parathyroid glands causes the signs and symptoms of the condition. The mutations associated with familial isolated hyperparathyroidism are thought to have a less severe effect on protein function than those that cause hyperparathyroidism-jaw tumor syndrome. Occasionally, individuals with familial isolated hyperparathyroidism later develop features of hyperparathyroidism-jaw tumor syndrome, although some never do. Familial isolated hyperparathyroidism caused by *CDC73* gene mutations may be an early or mild form of hyperparathyroidism-jaw tumor syndrome.

hyperparathyroidism-jaw tumor syndrome

More than 40 mutations in the *CDC73* gene have been found to cause hyperparathyroidism-jaw tumor syndrome. Most of these mutations result in a parafibromin protein that is abnormally short and nonfunctional. Without functional parafibromin, cell proliferation is not properly regulated. Uncontrolled cell division resulting from the loss of parafibromin function can lead to the formation of tumors in the parathyroid glands, jaw, uterus, and kidneys in people with hyperparathyroidism-jaw tumor syndrome. Parathyroid tumors, which can be cancerous or noncancerous, interfere with the gland's normal function and lead to primary hyperparathyroidism, a characteristic feature of hyperparathyroidism-jaw tumor syndrome.

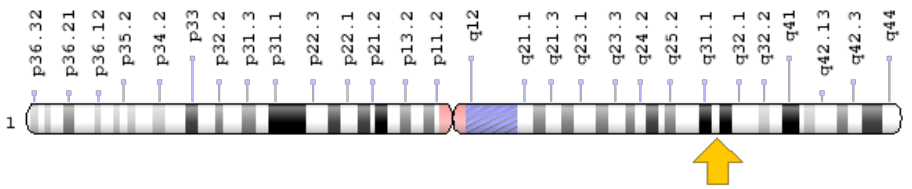
cancers

Some gene mutations are acquired during a person's lifetime and are present only in certain cells. These changes, which are called somatic mutations, are not inherited. Somatic changes in the *CDC73* gene have been identified in many parathyroid cancers. These mutations prevent parafibromin from effectively regulating cell proliferation, leading to uncontrolled cell growth and tumor development. It is unclear why these mutations are associated with cancer in the parathyroid glands but not in other tissues in the body.

Chromosomal Location

Cytogenetic Location: 1q31.2, which is the long (q) arm of chromosome 1 at position 31.2

Molecular Location: base pairs 193,121,958 to 193,254,815 on chromosome 1 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- C1orf28
- CDC73_HUMAN
- cell division cycle 73, Paf1/RNA polymerase II complex component, homolog (S. cerevisiae)

- cell division cycle protein 73 homolog
- HRPT2
- hyperparathyroidism 2 protein
- hyrax
- HYX
- parafibromin

Additional Information & Resources

GeneReviews

- CDC73-Related Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK3789

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28CDC73%5BTIAB%5D%29+OR+%28%28HRPT2%5BTIAB%5D%29+OR+%28parafibromin%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1080+days%22%5Bdp%5D

OMIM

- CELL DIVISION CYCLE PROTEIN 73, S. CEREVISIAE, HOMOLOG OF
  http://omim.org/entry/607393
- PARATHYROID CARCINOMA
  http://omim.org/entry/608266

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/CDC73ID181ch1q31.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=CDC73%5Bgene%5D
- HGNC Gene Family: Paf1/RNA polymerase II complex
  http://www.genenames.org/cgi-bin/genefamilies/set/1029
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=16783

- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/79577
- UniProt
  http://www.uniprot.org/uniprot/Q6P1J9

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